JOHN DAY RIVER SUBBASIN FISH HABITAT ENHANCEMENT PROJECT

ANNUAL REPORT 1991

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ABSTRACT

During 1991, 5 leases were signed adding 5.25 miles of stream to the program. Fence construction included 9.95 miles of riparian fence and 15 livestock water crossings. We constructed 3 log wiera for adult salmon holding, added 280 ft. of new channel, and placed 274 fish habitat boulders, 6 trees and 31 rootwada for juvenile rearing. We constructed 15 stream deflectors and 276 linear feet of bank riprap for streambank stabilization.

INTRODUCTION

This project. initiated July 1, 1984, under Bonneville Power Administration (BPA) contrat number DE A179-84 BP17460 provides initial landowner contacts, agreement development, project design, bugeting. and implementation for an anadromoua fish habitat improvement program on Privately owned lands within the John Day Basin.

The purpose of the John Day Fish Habitat Enhancement Program is to enhance production of indigenous wild stocks of spring chinook and summer steelhead within the subbaain through habitat enhancement and access improvement. The John Day River system supports the largest remaining wild runs of spring chinook salmon and summer steelhead in northeast Oregon. It is the goal of this program to preserve and enhance the unique genetia component of the stocks. By attaining this goal we will be able to rebuild fish runs in other Columbia River tributaries in the future, if desired.

DESCRIPTION OF PROJECT AREA

The John Day River drains 8,010 square miles of land in east central Oregon and is the third largest drainage in the state (Figure 1). The subbaain includes a major part of Gilliam, Grant, and Wheeler counties and portions of Crook, Harney, Jefferson, Morrow, Sherman, Umatilla, Union, and Wasco counties.

The mainstem John Day River flows 284 miles from its source in the Strawberry Mountains to its confluence with the Columbia River just above the John Day Dam. The largest tributary, the North Fork, enters the mainatem John Day River at Kimberly (RM 184) and extends 112 miles to its headwaters in the Elkhorn Mountains near the town of Granite. The Middle Fork John Day River originates just south of the headwaters of the North Fork and flows roughly parallel to it for 75 miles until they merge at RM 31 of the North Fork. The South Fork originates from Snow Mountain near the town of Burns and drains the south aide of the Aldrich Mountains. It flows into the mainstem near the town of Dayville at RM 112.

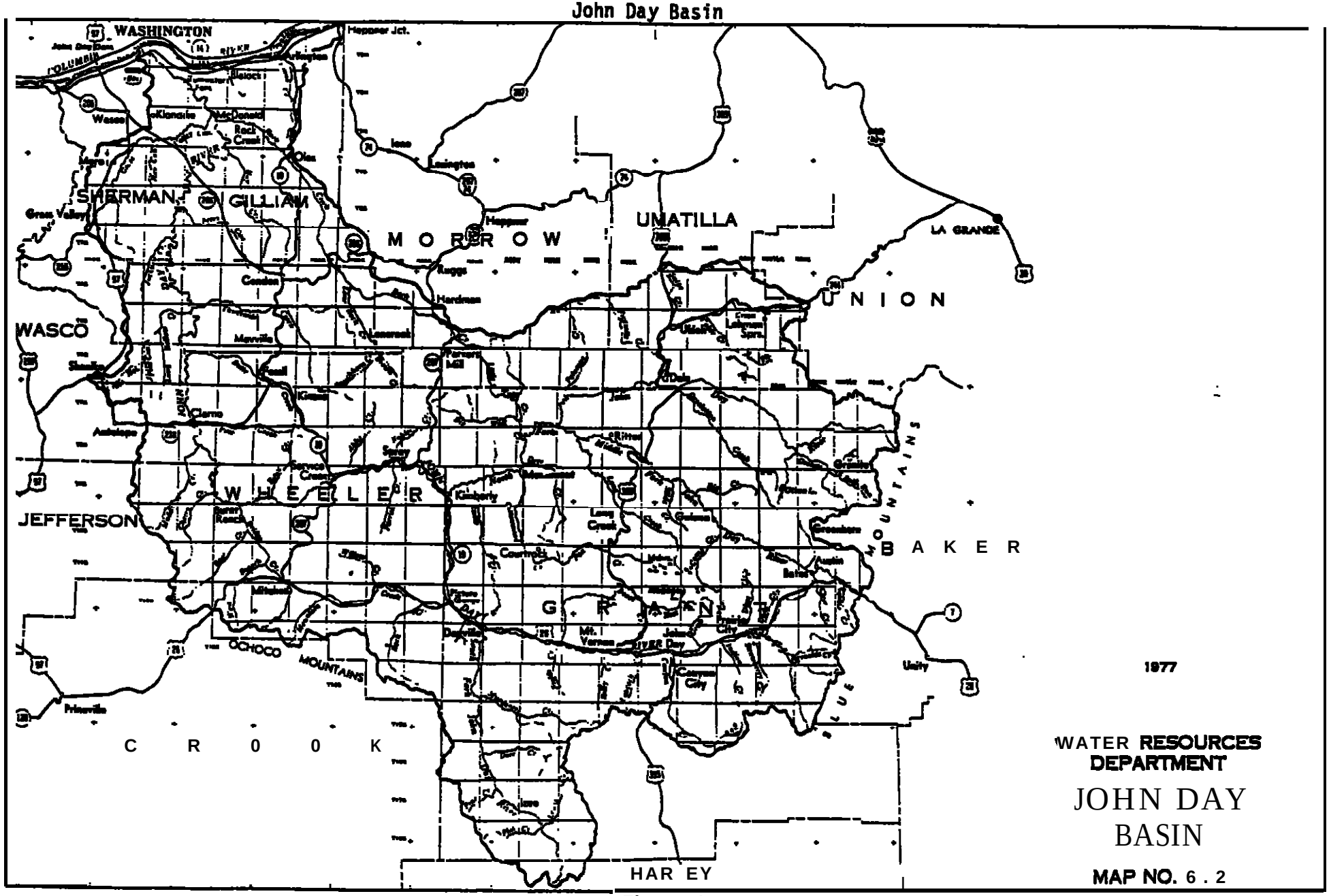
John Day Basin
WASHINGTON
SHERMAN
GILLIAM
MORROW
UMATILLA
UNION
WASCO
WHEELER
JEFFERSON
BAKER
GRANT
CROOK
HARNEY
OCHOCO MOUNTAINS
BLUE MOUNTAINS
LA GRANDE
1977
WATER RESOURCES DEPARTMENT
JOHN DAY BASIN
MAP NO. 6.2

Figure 1

HISTORICAL SUMMARY

Although several areas of Oregon and the Pacific Northwest were claimed by settlers and had begun agricultural development by the year 1862, the John Day aubbaain was still considered a wilderness, largely untouched by man.

Apparently the basin was once rich with riparian vegetation and beaver. The Peter Skene Ogden party, sent by the Hudson's Bay Company, frequently commented on the thick, lush vegetation they found while trapping on the John Day River. They caught 985 beaver between the months of January and July, 1826 (Binns 1967). Some of the basin's earliest settlers reported the river bottom as being smothered with cottonwoods and "thornbushes" along the streamlines and across the meadow bottoms (Oliver 1962).

Evidence of greater summer flows exists as described by William C. Aldred, the man who discovered gold in Canyon Creek. He is quoted as saying that in mid June of 1862 he was traveling with a group of men from Canyon Creek to Baker. In the upper end of the John Day Valley, above the town of Prairie City, the leader of his group almost drowned while trying to ford the river. None of the men wanted to attempt crossing because it was so deep and swift. After searching upstream and down for a suitable place to cross, they finally fell some cottonwoods across the channel and completed their crossing (Oliver 1962).

The Canyon Creek gold strike of 1862 began a series of changes within the basin. Almost imnediately 5,000 new people began sluicing gravels, homesteading the creek bottoms, and bringing in livestock to feed and finance their newfound homes. Stream bottoms ware cleared and planted to hay ground or grain, and stream courses were channeliaed and diverted for irrigation.

By the 1930s the drainage had gone through a major vegetative change. The "waving seas of grass" in the foothills were replaced with bitterbrush, sage, cheatgrass and juniper; and the cottonwood/ thornbrush (hawthorn) stream bottoms were replaaed with cultivated hay and grain fields.

Extensive large-scale gold dredging then occurred in the 1940s and 1950s. Six miles of the mainstem and 4½ miles of the Middle Fork were overturned. The North Fork, and a major tributary, Granite Creek, were dredged for a total of 28½ miles during this period. The dredges operated during the summer and fall, silting the water for months at a time. They overturned spawning beds. salmon eggs and all. totally altering stream channels and surrounding vegetation. Wany of these areas have never recovered.

Fish populations were also apparently greater around the turn of the century. Mr. Irving B. Haaeltine, who later became the Oregon Fish Commissions District Game Warden, reported counting 62 "silver salmon" going over a riffle in leas than an hour on the mainatem near the town of John Day one September afternoon around 1905. He went on to say that a dam constructed in the early 1900s. across the lower river (RM 177) near the town of Spray, killed this run of fall migrating silvera. He says this dam was constructed with a useless fish ladder

and received heavy poaching losses. The steelhead would begin going over the dam in March and the chinook in early June. All summer or fall migrations were blocked due to lower water and poaching. Fortunately this dam was washed out in 1934 and was never rebuilt. Many more smaller irrigation dame on the mainatem and tributaries have been erected during the summer and fall months since this time. These dame have severely restricted late summer adult migrations and even seasonal juvenile migrations (Hazeltine 1954).

These major habitat alterations have left the John Day River in its present state. Steelhead redd counts average 7.1 redds per mile with a spawner escapement of 34,000 adults. Spring chinook salmon redd counts average 10.6 redde per mile with a spawner escapement of 3000 adults, averages for the last 10 years.

More passage constrictions occur in the lower Columbia River; the John Day, The Dalles, and Bonneville dams all affect both downstream and upstream migrations.

Some improvements to fish production potentials have occurred. These include screening and bypass facilities on all irrigation withdrawals, some livestock control, fish habitat enhancement and the removal of some fish migration barriers. Much remains to be done, however, to return the John Day to an ideal level of production, approaching its turn of the century condition. This is the challenge of our program.

Funding for this endeavor is Provided by the Bonneville Power Administration under contract number DE A 179-84 BPl7B60. This funding provides for private land leasing, stream habitat inventory, planning and design work, contraat development. budgeting, instream habitat placement, vegetation enhancement, and poet construction review and maintenance. These activities are for anadromoua fish habitat improvement on private lands within the John Day Basin. This program coincides with other BPA habitat programs on BLM and Forest Service lands within the basin.

Specific areas that were included in the project during FY 1991 are: creek Mile (CM) 10.9 to 12.6 on Canyon Creek, a mainstem tributary entering at River Mile (RM) 207 near the town of John Day, RM 51.0 to 55.7 on the Middle Fork of the John Day River.

METHODS AND MATERIALS

The goal of this program is to optimize spring chinook and summer steelhead smolt production within the John Day River Basin using halbitat enhancement measures. All work is completed with the assistance of the Grant Soil and Water Conservation District (GSWCD) and the Soil Conservation Service (SCS). To accomplish this goal, work will progress in three phases:

1. planning and preparation (prework),
2. impl ementation, and
3. maintenance and evaluation.

PREWORK

Prior to actual project implementation the following activities are to be conducted:

Project Planning

Project planning includes design and layout of all work to be done onsite, landowner coordination, development of contracts and contract specifications, and obtaining the necessary work permits.

Project Preparation

Prior to signing leases or construction contracts, all lease boundaries and work sites must be identified, staked, and agreed upon by the landowner and/or contractor. Work sites may include easements or right-of-ways, fences, livestock crossings, instream structures, removal OF fish migration barriers, offsite water developments, planting and miscellaneous lease of construction related areas.

Riparian Lease Development and Procurement

Ripaniarl lease development and procurement includes meeting with landowners. and/or their legal representatives specifically for the purpose of developing an acceptable lease text, and/or signing lease documents.

IMPLEMENTATION

Implementation entails the actual on-the-ground work phase of the program and may include any or all of the following:

Instream structures

During late summer or fall when stream flows are lowest, structures will be installed in streams at locations preselected by fisheries biologisists and/or hydrologists. Structures of various types will be used to provide optimum pool/riffle ratios, raise the riparian water tables, collect spawning gravels, and increase the amount of large woody debris, thereby increasing quantity and quality of rearing and spawning habitats. Rock jetties and deflectors will be the primary

structures used to stabilize stream banks Boulders will be used to create small. rearing pools and hiding cover.

Planting

During the early spring, shrub and/or tree species may be planted at preselected locations along streams within project areas. Since high summer water temperature appears to be a major limiting factor. plantings will be made to provide stream shade, thereby reducing summer water temperatures and increasing salmonid utilization of streams. The maximum shade attainable for most streams in project areas is estimated at about 80 percent. The objective of this phase of the program is to reach a minimum of 70 percent shade and have water temperatures of no more than 68 degrees farenheit within 20 years of project implementation.

During the fall, areas disturbed while doing implementation activities will be seeded to stabilize soils and discourage weed growth.

Fencing

Destruction of streamside vegetation by domestic livestock has been a major problem within project areas. To provide protection from livestock and thereby promote rapid recovery of existing and planted vegetation, fences will be constructed along riparian zones within project areas.

Photopoint Establishment

Photopoint establishment includes locating and placing pernmanent markers at sites from which photographs can be taken at regular intervals, thereby depicting riparian changes through time. AlS0 associated with photopoint establishment is the development of a photopoint notebook for each project area.

Offsite Water Developments

In an attempt to reduce the number of watering gaps in riparian fences (thereby reducing fence construction and maintenance costs), and to encourage livestock utilization of vegetation away from riparian areas, offsite water sources will be developed.

Habitat Monitoring Transects

Within selected project areas permanent habitat monitoring transects will be established. Specific measurements will then be taken along each transect. These measurements will be repeated at regular intervals and compared with original measurements as a means of quantitatively measuring environmental changes through time.

Miscellaneous Field Activities

Cooperator sign boards denoting riparian enhancement projects as cooperative efforts between BPA, ODFW and private landowners will be installed at high visibility sites along completed riparian enhancement project areas.

MAINTENANCE AND EVALUATION

Postwork entails all maintenance and evaluation of work which has been done within project areas. This phase of the program will usually begin the year following completion of implementation and will continue for several years. Typical postwork activities may include:

Project Maintenance

Following completion of implementation a biannual inspection of all project areas will be made. Following these inspections all fence and instream structure maintenance will be done. Stream cross fences and/or watergap cross fences will be either Put in or removed during these inspections or subsequent maintenance.

Photopoint Picture Taking

Standardized pictures will be taken from preseleoted photopoints prior to implementation on any project area and then during the spring and fall for two yesrs immediately following completion of a project. Once these initial photos are obtained the frequency of photopoint picture taking may diminish to once every two to three years.

Habitat Monitoring Transect Data

Immediately after establishing habitat monitoring transects, baseline data will be collected. Data collection, following the establishment of baseline data, will be done on the first year following completion of implementation activities and then at approximately 3 to 5 year intervals.

Thermograph Data Collection and Summarization

Thermographs have been installed within and/or adjacent to selected project areas. These thermographs will then be monitored on a regular basis to detect changes in water temperatures.

Miscellaneous Field Activities

Steelhead redds are counted in index areas on three of our recovering streams. These counts will be used to document changes in adult spawner returns to our treated areas.

Waterfowl and other bird species are counted yearly within two index areas. These counts will monitor change in bird species abundance as woody vegetation replaces grass.

RESULTS AND DISCUSSIONS: I. FIELD ACTIVITIES

PREWORK

Riparian Lease Development and procurement

Project personnel signed five riparian leases, allowing treatment of 5.25 miles of stream within the subbasin. Four leases were signed on the Tuttle, Baucum, Cosgrove and Still properties allowing us to work on 1.75 miles of Canyon Creek. One lease was signed on The Nature Conservancy property allowing us to fence 3.5 miles of the Middle Fork of the John Day River. This will require 9.6 miles of fence of which only 6.75 miles was completed this year.

In addition to the five signed leases, the GSWCD persued leases with the following landowners throughout the year.

- Mike Brown who owns 3.1 miles of Mountain Creek and agreed to sign a lease with us for 1992.

- Rotchy Barker, owner of the Oxbow Ranch on the Middle Fork. He informed us that he has been working with Ed Chaney on a much larger scale project than what we were offering. All negotiations have been confidential, at Mr. Barker's request. We have asked for, and recieved a full briefing from Mr. Chaney on the contents of his proposal for this ranch.

- Two landowners on the Mainstem who agreed to sign leases but their property would have required too many stream bank stabilization structures.

- One landowner on Long Creek, who we have approached before, and again refused to accept our proposal. Another Long Creek landowner was approached but we did not persue his lease because of the small section of stream that he owned. He will be included if we can get others to join him in this section of the basin.

- One landowner on Fox Creek, who we have approached before, and again refused our proposal.

- One landowner on Cottonwood Creek, who we have approached before, and again refused our proposal.

Project preparation

Mapping, design and layout of construction work was completed and all instream work psrmits were applied for and obtained.

Contract preparation for instream work was completed by GSWCD for Canyon Creek. preparation included determining rock quantities, writing contract specifications, mapping project sites and preparing work sites. The resulting contract was put out for bid and awarded by ODFW's Engineers.

Contracts were written for fence construction on Canyon Creek and then awarded by purchase order. ODFW's Engineers prepared and awarded contracts for fence construction on the Middle Fork John Day River.

Field Inventories

A walk-through habitat inventory was performed on all project stream reaches scheduled for implementation. Survey results showed a lack of adult holding pools and juvenile rearing cover, and eroding banks as being the most prevalent stream problems an Canyon Creek. Survey results also showed high stream temperatures and a lack of juvenile rearing cover on the Middle Fork of the John Day.

A survey was performed on The Nature Conservancy's property to determine presence and abundance of rearing juvenile chinook in side channels and irrigation ditches. Since none were found a determination was made on what measures would be required to make this habitat available to fish. Specifications were then decided upon between ODEW, the Umatilla tribe and The Nature Conservancy for a mapping contract to be used for determining costs and impacts to the preserve. Implementation of this mapping contract and the feasibility study will occur next year.

IMPLEMENTATION

Instream Structures

Instream structure construction, woody debris and boulder placement, began on August 19th and continued until August 30th. A total of 1.75 miles of stream were treated on Canyon Creek. No instream work was done on the Nature Conservancy property.

Fencing

Construction was completed during November on 3.2 miles of hi-tensile smoothwire fence which protected 1.03 miles of Canyon Creek.

No fence was constructed on the Cosgrove property because the landowner agreed to control livestock grazing far 15 years on his entire property.

Construction began in August on 9.6 miles of hi-tensile smoothwire fence which will protect 3.5 miles of the Middle Fork. Work proceeded until mid-November with 6.75 miles being completed. The remaining fence will be constructed in 1992.

This year we had two new contractors who bought CCB registration numbers and were able to bid on our fence contracts. One of these contractors got low bid and the other did not get a BPA funded contract. Each person spent over 11000.00 to get registered. This brings our total number of liaensed local contractors up to 4 which is barely enough to work with.

Photopoint Establishment

We established 18 new photopoints on Canyon Creek this year. The Nature Conservancy established several more on their Middle Fork property which they will retake in the the future.

Planting

Five hundred cultured willow cuttings were planted on Canyon Creek to help speed recovery on the Rawlins property. Five hundred willow and redosier dogwood cuttings were planted by the landowner on Long Creek.

All implementation activities are summarized in Table 1.

Table 1. Work completed in 1991. by the John Day Basin Private Lands Habitat Improvement Project

Stream ·	Canyon Creek				Middle Fork Nature	Totals
Landowner	Tuttle	Baucum	Still	Casgrove	Conservancy	
Stream length	0.44	0.62	0.37	0.32	3.5	5.25 mi
Increased stream length	280 ft.	0	0	0	0	0
Fence construction	1.1	1.4	0.7	0	6.75	9.95 mi'
Log wiers	0	2	1	0	0	3
Rootwads placed	0	15	16	0	0	31
Trees cabled	0	0	3	3	3	6
Boulders	94	100	30	0	0	224
Stream deflectors	1	1	13	0	0	15
Rock riprap (ft)	114	40	90	30	0	274 ft
Livestock crossings,	1	8	3	0	3	15
Culvert placement,	1	0	1	0	0	2
Plantings	500 willow cuttings on Canyon Creek 500 willow and redosier dagwood cuttings on Long Creek					

MAINTENANCE AND EVALUATION

Project Maitenance

Several ice jams formed and moved down the Mainstem during January after a month of below zero temperatures. It was the first time since construction that project structures have faced this type of pressure. We looked for damage at several sites,but found only some crushed vegetation on gravel bars. We checked and photographed these sites later in the year; many of the previously injured willow and cottonwood had survived only having lost some of their branches. Ice scour has retarded vegetative recovery on some Mainstem treatment areas, but regeneration from buried rootmass is showing a healthy recovery..

Eight hundred fence stays were delivered to the Bentley Ranch to complete the rebuilding of their Deer Creek fence. This will complete the conversion of this fence from smoothwire electric to 5 strand high tensile. 'All labor was performed by the landowner and we provided the materials as per our lease agreement.

All project fences, rook structures and livestock watering devices were surveyed to assess repair needs in April and early May. No structureq or fences were damaged as a result of the ice flows but two 1ivestock watergaps above Prairie City required rebuilding.

A severe flood hit the mainstem John Day on May 18 rising 3.5 feet above flood stage and lasting for 4 days. Flooding was isolated to the Mainstem between Prairie City and Fax Creek. After this event project personnel spent the rest of the month assessing damages and beginning repairs. We lost 0.25 miles of fence and had major repairs to do on another 1.75 miles. Three livestock watergaps and 4 cross fences were damaged and had to be rebuilt. Twenty watergaps required only moderate repairs.

A section of fenoe on the Mainstem/Dow property was relocated further away from the river after permission was granted by the landowner. He allowed us to da this to avoid problems in the future. Another landowner on the Mainstem allowed us to relocate a fence above Prairie City after it had received severe flood damage.

Instream structure damage was minimal but we did suffer some stream bank damage on areas that were not treated during original construction. We identified 4 stream bank sites on the mainstem/Carter Property that will need to be reinforced.

Project personnel put in 358 man-hours of additional fence maintenance as a result of this flood. Most of the flood flows rose completely out of the riverbanks and caused minimal stream bank erosion compared to earlier, floods. This can be attributed to healthier vegetative cover we now have compared to earlier years.. The floodwaters deposited several inches of silt over recovering gravel bars which will help stabilie them.

Maintenance was completed in a satisfactory amount of time this year even with the extra work required by the flood. We asked for and

recieved 4 months of extra technician time this year to help us complete this ever inoreasing task.

High leveis of beaver activity within cur riparian exclosures occurred again this year. Many young willow and cottonwood are now 2 to 4 feet high and beavers have begun to devour them. We will continue to monitor these sites to see if beavers are affecting vegetative recovery.

Photopoint Picture Taking

Photopoint monitoring was conducted only on selected areas along the Mainstem this year. Flood damage repair took most of our time during the early sumner months Those photopoints are shown in APPENDIX C.

Thermograph Data Collection and Summarization

Two thermograph monitoring points were established in Cottonwood Creek this January. They were stationed above and below a ½ mile long treatment area to record changes in temperature. In the treatment area, water temperatures were found to be 0.4° C warmer in the winter and 3.5° C cooler in the summer than the non treated stream. Maximum recorded temperatures were 7.1° C cooler after flowing through our treatment area (Appendix Al. These temperature data are the first collected on Cottonwood Creek, and therfore will be used as our baseline for comparison with future temperature data collected.

Miscellaneous 'Field Activities

Bird surveys'were performed on two index riparian areas during May. Twenty five different 'species were counted on the Fox Creek/McGirr property and Twenty six on the Mainstem/Emmel property. The biggest increase occurred in Blue Winged Teal numbers, which were using the receeding floodwaters in Fox Creek as feeding sites. The weather was wet and overcast during the entire counting period which could have influenced our counts.. Table 2 shows speaies counts in these areas for the last six years since our projects were initiated there.

Table 2. Species of Birds counted in two index areas between 1996 and 1991.

Location	Year					
	1986	1987	1988	1989	1990	1991
Fox Creek McGirr property	11	24	23	26	19	25
Mainstem Emmel property	20	28	26	29	32	26

The floodwaters of May washed out all evidence of steelhead redds making an accurate count impossible this year. Spawning ground surveys were therefore not conducted.

Habitat Monitoring Transect Date

Tan stream transects were remeasured on the Mainstem above the town of John Day. After 4 years of recovery these data showed a reduction in wetted width of the river by an average of 5.5 feet. and an increase in water depth by an average of 8.5 inches. (Appendix B).

Some photographs showing project recovery are included in Appendix C.

RESULTS AND DISCUSSION II. PROGRAM ADMINISTRATION

Reports and Data Summaries

Monthly progress reports and the 1990 annual report were submitted to B P A during 1991.

The tachnicaian completed individual implementation summaries for all fish habitat projects done in the last two years. He then aumnariaed all work completed in the last 6 years for a Oregon Dept. of Water Resources report.

Budgets/Purchases

Preparatiqn of the 1992\93 work statement and budget began in November and continued through the end of the report period.

All construction materials for project implementation and maintenance ware purchased during the report period.

Logs tor the Canyon Creak wiera were purchased from the Malhaur National Forest, felled, bucked, and transported to work sites. Rootwada were obtained. from the Malheur National Forest free of charge and then transported to the work sites.

Monthly purchasing summarys were submitted to the regional office d u r i n g 1 9 9 1 .

Personnel:

Larry Brown began the year as the project technician but accepted another job in February. His position remained vacant until June when we hired Jim Jerome to replace him.

Russ Powell was hired as the project's seasonal maintenance technician.

Some of the training we attended were: The American Fisheries Society's conference on fish habitat improvement, the Northeast Region's annual Penland Lake conference, a future habitat program direction discussion about the John Day basin. a future program direction meeting with' Rick Stoota and Mark Shaw diaoussing the entire region's habitat programs, and the annual fish habitat biologist's conference which the John Day craw hosted this year.

INTERAGENCY COORDINATION/EDUCATION

Interagency Coordination

A cooperative agreement was developed between ODFW, the Grant County Soil and Water Conservation District and the Soil Conservation Service to outline each agencies duties for FY 1991. Funding included 12 months ot engineering support,and 1/2 month of District Conservationist's time.

Monthly Grant Soil and Water Conservation District meetings were attended to keep board members informed of progress on BPA habitat projects.

The project biologist participated in a technical work group in charge of managing the fisheries on the Nature Conservancy's Riddle Pork property.

Consultation and field review was provided to personnel from the Malheur National Forest on their 1991 instream construction project on the Middle Fork John Day River.

Consultation and review was provided to the fisheries staff of the Wallowa Whitman National Forest reguarding their 1990 Trail Creek habitat improvement project. We also provided them with high-tensile smoothwire fence conatruation specifications.

Project personnel recieved a critique of some fish habitat improvement projects from a team of scientists hired by BPA. Scientists included Robert Beatcha, OSU forest stream hydrologist; Bill Platts, fisheries scientist: and Boone Kauffman, OSU riparian ecologist. They looked at projects on Long, Fox, and Canyon Creeks and wrote a report on their findings and recomnandationa.

The biologist discussed the beat areas for stream rehabilitation work on the North Fork and its tributaries with the Water Resources Department. This information will be included in a new water optomiaation study for that subbasin.

Education

The biologist spent a day teaching young anglers about trout and trout habitat during Oregon's free fishing day.

The biologist taught a 4-H club about stream biology and fish habitat which consisted of 54 junior high school students at summer camp.

The biologist showed Nature Conservancy personnel the new fence around their Middle Fork property, how to maintain it, and how to assemble and disassemble the water aroaainga.

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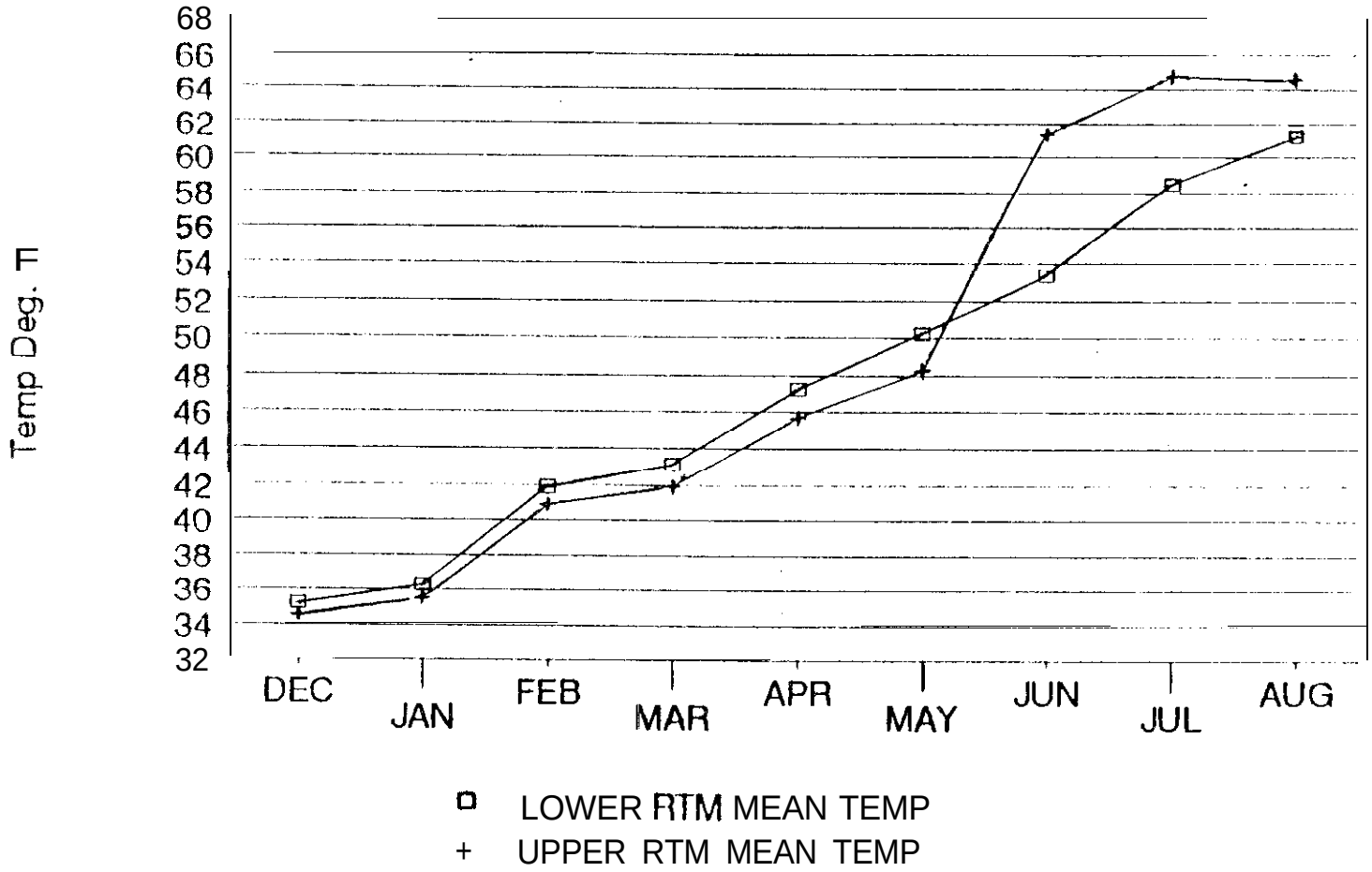
APPENDIX A

Thermograph Data Summarization

Cottonwood Creek

Lower/Upper RTM Data Points



APPENDIX B

HABITAT TRANSECT DATA

Comparison of 1987 and 1991 habitat monitoring transect data collected from the Mainstem John Day River on the Dow proparty.

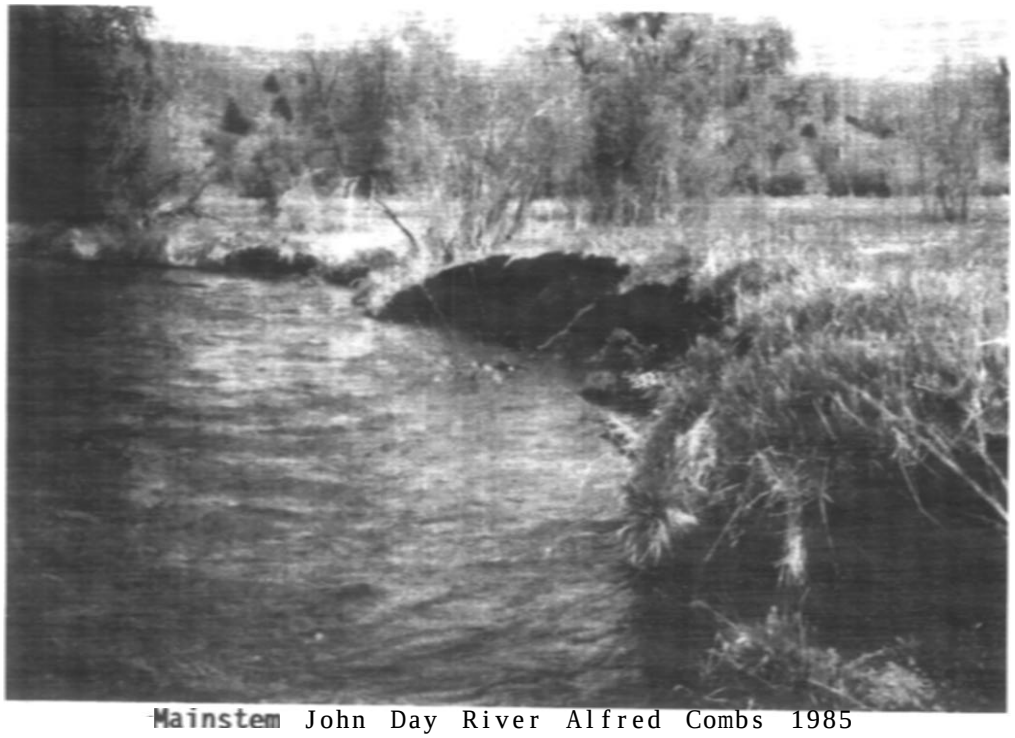
Transect number	Stream Width (feet)			Maximim Stream Depth (feet)		
	1987	1991	Change	1987	1991	Change
1.	68.5	62.2	-6.3	1.0	1.0	+0.4
2.	70.0	63.0	-7.0	1.0	1.0	+0.4
3.	69.0	63.0	-6.0	1.0	1.5	+0.5
4.	70.0	63.0	-7.0	0.8	1.9	+1.1
5.	70.0	63.0	-7.0	0.9	1.6	+0.7
b.	60.0	50.5	-13.5	1.2	1.8	+0.6
7.	54.5	58.0	+3.5	1.2	2.1	+1.1
a.	59.5	59.0	-0.5	0.9	1.9	+1.0
9.	56.0	51.0	-5.0	0.9	1.6	+0.7
Averages	64.7	59.1	-5.5 ft	1.0	1.7	+0.7 ft

After structural treatment and 4 years of riparian recovery. this section of the Mainstem John Day River was reduced in width by an average of 5.5 feet. Its deepest point has been increased by an average of 0.7 feet.

These transects were taken at 30 foot intervals on the Dow property at River Mile 250.8 during summer low flow water levels.

APPENDIX C

Photographs



Mainstem John Day River Alfred Combs 1985

The top photo shows a cut bank eroded during spring flows within our Spring Chinook spawning grounds. This eroded sediment later settles upon the salmon redds and smothers the eggs.

The bottom photo shows how erosion control structures and livestock exclosure fences were used to end the bank cutting, provide deep pools, and create more fish rearing habitat. Vegetation is recovering quickly. This will eventually shade the river, provide organic input, and help stabilize the bank for many years. Note how our rock structures have silted in, and are being incorporated into the stream bank.

Mainstem John Day River Alfred Coombs Property 1991

Mainstem John Day River Alfred Coombs Property 1985

The top photo shows a wide shallow stream with eroding banks andonly a small amount of fish cover. The bottom photo shows the result of 6 years of recovery after the installation of jetties, boulders, and livestock exclosure fence. The banks have stopped eroding the channel has narrowed and deepened. Fish cover has greatly increased, the vegetation boomed without livestock pressure. Note the small woody vegetation in the foreground that will soon provide shade and fish habitat to the stream.

Mainstem John Day River Alfred Combs Property 1991

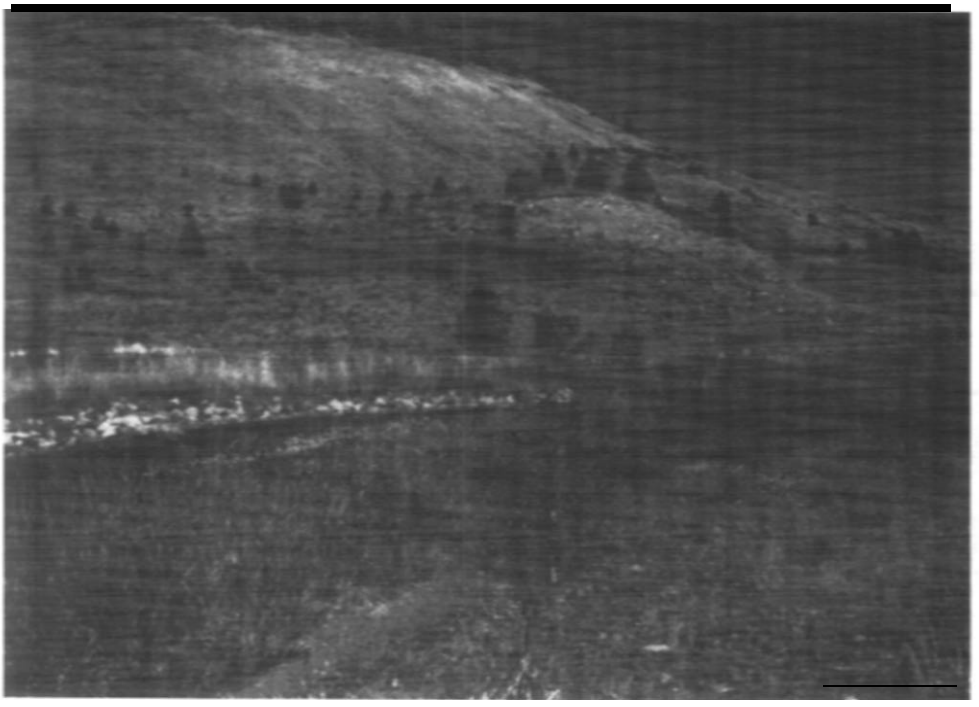
Manistem John Day River. Neal Dow Property. 1987

This area shows deposition and vegetative recovery that has occurred over the last 4 years.

Mainstem John Day River. Neal Dow Property. 1991

Mainstem John Day River. Neal Dow Property. **1987**

Here is an area that was riprapped on the far bank with a combination of rock structures and juniper structures. The bottom photo was taken 4 years later.



Mainstem John Day River. Neal Dow Propertry. 1991

Mainstem John Day River. Neal Dow Property. **1987**

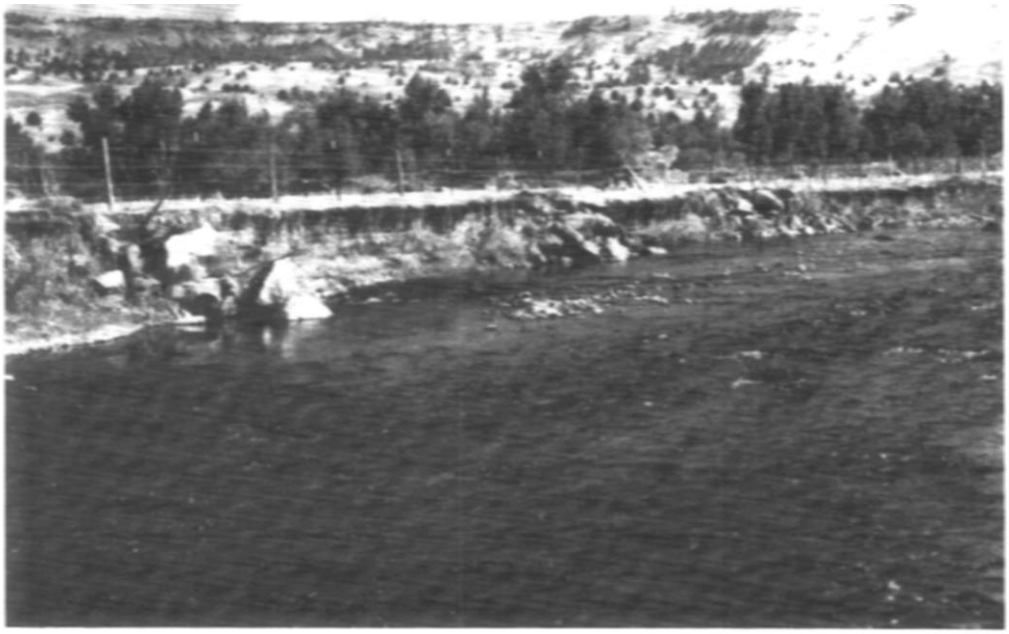
The top photo shows this area shortly after jetty construction and boulder placement. This area had begun a recovery but a severe flood came through May of this year. The bottom photo was taken 3 months after this flood. Notice the bedload deposition on the right bark that buried a lot of new vegetation. This deposition is how banks are bui!t and how the river becomes narrower and deeper.

Mainstem John Day River. Neal Dow Property. **1991**

Mainstem John Day River. Donna Holmstrom Property. **1985**

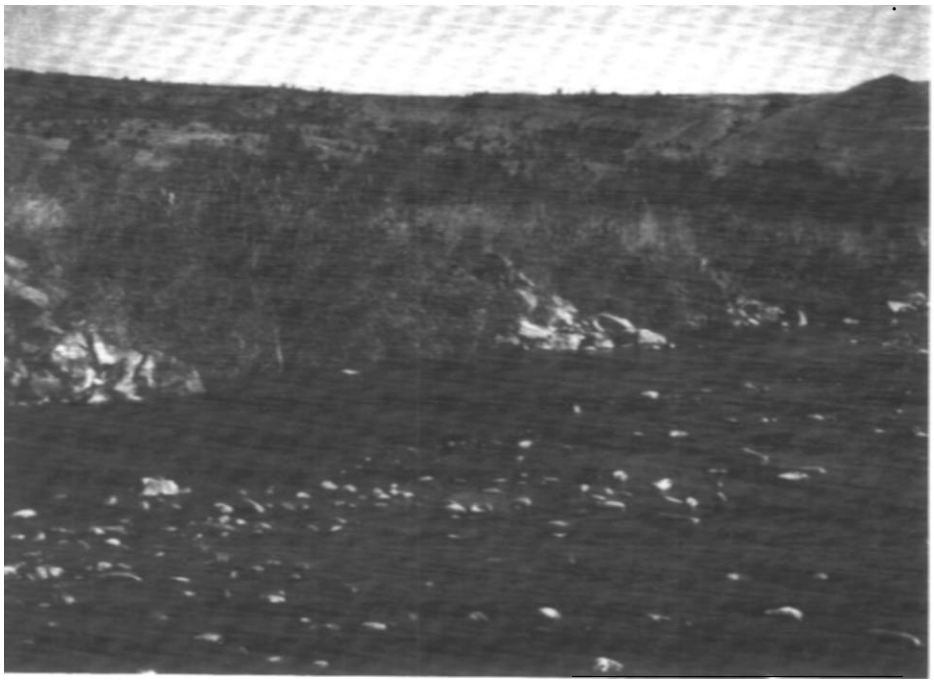
The too photo shows a large gravel bar with little vegetation. Stream channel is wide and shallow, providing Little fish habitat. It al so shows the landowner's attempts to prevent erosion. The bottom photo shows a new riparian exclosure fence and rip-rapped bank, with the results of 6 years of livestock exclusion and erosion control structures.

Mainstem John Day River. Donna Holmstrom Property. **1991**



Mainstem John Day River. Donna Holmstrom Property. 1985

Treeless riverbanks are the reason for a lot of problems effecting streams. With no shade, the water temperature can become lethal, with no root masses the banks fall apart, and with no woody debris, you get very little fish habitat.
This area demonstrates how to grow vegetation on a 4' verticle bank. We used jetties to collect sediment and fence ot exclude livestock. After 4 years we have young cottonwoods 8 -17' tall and growing at an astonishing rate.



Mainstem John Day River. Donna Holmstra Property. 1991